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AND DIMENSIONS OF THE COUNTERGLOW [-

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THE ELIVEN-YEAR VARIATION CYCLE OF THE BRIGHTNESS, FORM
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1. Systematic observations of the counter glow were initiated in Ashkhabad in 1942; the author's visual observations resulted in the detection of its diurnal parallax $\pi \approx 3^\circ$ in 1943 [1] and the inconstancy of its form and brightness, particularly during strong aurora borealis [2]. This prompted the author to propose the hypothesis of the gaseous nature of the counter glow [1-3], and refute the Multon-pulden idea of the concentration of meteoric particles near the Lagrange liberation point [4]. The processing of 300 observations in 1942-1945 [5] also revealed the presence of a longitudinal term in the expression for the latitude of the counter glow center [6], and again confirmed the known fact of this center's lag to the west of the antihelium. This enabled us in 1950 to produce the first ephemeris of the counter glow [6]. Another discovery was the non-coincidence of the optical and geometrical centers of gravity. The parallaxes of the different parts of the counter glow were occasionally found to be different, and occasionally revealed a tendency to diminish [7]. This may have been indicative of the flocculent structure of the Earth's gaseous envelop, and the tendency of these heterogeneities to move away from the Earth [7]. The latter should be verified by the use of instruments.

2. The observations made after 1945 were less systematic but covered more than one cycle of helioactivity (1942-1957, including the previous ones), and they already justify the following conclusions. In the period of minimum solar activity (1942-1943 and 1951-1953), the counter glow appears to be "compressed" as it were, has a minimum latitude ($\sim 7 - 8^\circ$) and

longitude ($\sim 13^\circ$) and is shaped like an ellipse, its large axis being in parallel with the ecliptic; the counter glow is on the whole not very bright, and it is not visible every night under average observation conditions. During the powerful eruptions on the sun that produce the aurora borealis, the counter glow becomes "conspicuous" and several times brighter for 1-2 night; it takes on a nondescript and irregular form with a number of separate tongues; this phenomenon occasionally extends over an area up to 30° longitude and $15-18^\circ$ latitude, with several centers of greater brightness. The same happens in the periods of maximum solar activity (1947-1948 and 1956-1957); the counter glow became considerably brighter; in Ashkhabad, for example, where the counter glow could not be observed since 1950 because of the increasing city lights, it became visible again in 1956 despite the continued increase of the city illumination. This is particularly noticeable now in connection with the observations carried out under the IGY program (problem 26). During the current increased solar activity, the counter glow is seldom seen as "compressed" or elliptical; it usually covers a huge area (hundreds of square degrees of the celestial sphere); it has a very irregular outline which may last for several nights in a row or change within a single night. It is to all this that we call the particular attention of the observers in the current IGY period. We get the impression that the appearance and form of the counter glow undergo changes during the 11-year cycle of solar activity, similar to those of the solar corona, for example. The general increase in the brightness of the counter glow has its analogy in the well known rising brightness of the comets during the maximum sunspot activity when increased numbers of new comets are discovered as a result.

It should be pointed out that the zodiacal light reveals parallel variations; in particular, its 3° latitude of July-December 1957 (which is

normal for a period of minimum activity) has now increased to $6-8^{\circ}$ as has the over-all brightness. But this relationship in the field of the zodiacal light is a great deal more complicated and calls for a separate examination.

Ashkhabad,
Dec. 1957.

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